LESSON 3: TYPES OF PHYSICAL AND HEALTH HAZARDS

TRAINER'S NOTES: Introduction and Learning Objectives

*Ask trainees to look at the Introduction and Learning Objectives on page **3-1** of their Student Notebook and emphasize the following:*

- In the preceding lesson you saw that the Hazard Communication Standard covers both physical hazards and health hazards. This lesson introduces you to the different types of hazards in each of these two categories. It helps you understand how each type of hazard can affect your health and safety.

- In this lesson, you'll see how to identify —

  - the basic types of physical hazards;
  - the different types of fire hazards;
  - two types of unstable/reactive chemicals; and
  - eight basic types of health hazards.

LESSON 3: TYPES OF PHYSICAL AND HEALTH HAZARDS

INTRODUCTION

In the preceding lesson, you saw that The Hazard Communication Standard covers both physical hazards and health hazards. This lesson introduces you to the different types of hazards in each of these two categories. It helps you understand how each type of hazard can affect your health and safety.

LEARNING OBJECTIVES

When you have completed this lesson, you should be able to do the following

Identify the basic types of physical hazards.

List and define types of fire hazards.

List and define two types of unstable/reactive chemicals.

Identify eight basic types of health hazards.

STUDENT WORKBOOK PAGE: 3-1

TRAINER'S NOTES: Learning Resources

Videotape Segments 3A and 3B, located on Tape 1

TRAINER'S NOTES: Directions for Proceeding

Direct trainees to disregard page 3-2 *of the Student Workbook and to proceed to page* 3-3 *of the Workbook.*

LEARNING RESOURCES

- Videotape Segment 3A: Types of Physical Hazards

. Workbook Application Exercise 3A-1: Defining Physical Hazards

. Workbook Application Exercise 3A-2: DOS and DON'TS

- Videotape Segment 3B: Types of Health Hazards

. Workbook Application Exercise 3B-1: Defining Health Hazards

. Workbook Application Exercise 3B-2: Recognizing Workplace Health Hazards

. Lesson Summary

DIRECTIONS FOR PROCEEDING

Complete the following steps in order. You might want to check off each step as you complete it.

1) Read the workbook introduction to Videotape Segment 3A.

2) Watch Videotape Segment 3A.

3) Complete Application Exercise 3A-1 in this workbook.

___ 4) Complete Application Exercise 3A-2 in this workbook.

___ 5) Read the workbook introduction to Videotape Segment 3B.

___ 6) Watch Videotape Segment 3B.

7) Complete Application Exercise 3B-1 in this workbook.

___ 8) Complete Application Exercise 3B-2 in this workbook.

___ 9) Read the lesson summary.

STUDENT WORKBOOK PAGE: 3-2

TRAINER'S NOTES: Introduction to Videotape Segment 3A

Note: *Ask trainees to look at the videotape introduction on page* 3-3 *of the Student Workbook and emphasize the following.*

Ask trainees to recall the definition of a physical hazard — chemicals that can cause explosion, fires, violent chemical reactions, or other hazardous situations. Emphasize the following.

■ As we watch this videotape, you should learn to —

. recognize the basic types of physical hazards and the safety risks each presents;

- identify different types of fire hazards; and
- recognize unstable or reactive chemicals.

INTRODUCTION TO VIDEOTAPE SEGMENT 3A: Types of Physical Hazards

Physical hazards are chemicals that can cause explosion, fires, violent chemical reactions, or other hazardous situations.

As you watch this videotape segment, learn to recognize the different types of physical hazards in the workplace. Notice how compressed gases, explosives, fire hazards, and unstable or reactive chemicals can affect your safety.

Now, watch Videotape Segment 3A.

STUDENT WORKBOOK PAGE: 3-3

TRAINER'S NOTES: Application Exercise 3A-1

Ask trainees to turn to page 3-5 of their Student Workbook. Either lead the class through Application Exercise 3A-1 as a group activity, or provide time for students to complete the exercise individually or in small groups. The answers and additional information given below appear on pages 3-6 and 3-8 of the Student Workbook.

Answer **Additional Information**

1) **The** four basic types of *PHYSICAL* hazards are —

. compressed gases;
. explosives;
. fire hazards, including combustible% and
. unstable or reactive chemicals.

2) **Note:** You *may wish to list choices A to D on the chalkboard and ask,* " What type of physical hazard _____?" *for each description given.*

B Contains a lot of stored energy

A Ignites and burns easily

D Causes a sudden release of pressure and heat

c Causes a dangerous situation when mixed with other chemicals

Compressed gases contain a great deal of stored energy. They are physical hazards because the sudden release of this energy is dangerous. Explosives and reactive chemicals can cause a sudden release of energy.

Chemicals that ignite and burn easily are fire hazards. So are chemicals that cause or support fire in other materials.

Explosives are chemicals that can cause a sudden and violent release of pressure, gas, and heat.

Reactive chemicals produce or release a hazard when allowed to contact certain other chemicals.

3) D Oxidizers are fire hazards that supply the oxygen required to start or support afire. Oxygen itself is an oxidizer. Many materials that contain oxygen, such as peroxides, are also oxidizers.

APPLICATION EXERCISE 3A-1: Defining Physical Hazards

Directions: Check or circle your answer(s) to each question, or write your answer in the blank provided. When you complete the exercise, fold over the right side of the page to check your answers. Then turn the page to get more information about each question.

1) What are the four basic types of *PHYSICAL* hazards?

_____ _____

_____ _____

2) Match the description with the type of physical hazard.

____	Contains a lot of stored energy	A) Fire hazard
____	Ignites and burns easily	B) Compressed gas
____	Causes a sudden release of pressure and heat	c) Reactive chemical
____	Causes a dangerous situation when mixed with other chemicals	D) Explosive

3) Which type of physical hazard causes or supports fire in other materials?

A) Combustible liquid

B) Pyrophoric

C) Flammable liquid

D) Oxidizer

STUDENT WORKBOOK PAGE: 3-5

Answer **Additional Information**

4) *Remind students of the definition of* ***FLASH POINT*** *— the temperature at which a liquid gives off enough vapor to burst into flame when exposed to an ignition source. Write the following flash points on the chalkboard and poll trainees as to whether each liquid is flammable, combustible, or not a fire hazard. Reinforce definitions with answers.*

Chemical	Flash Point	Answer
Turpentine	95°F	A, Flammable
Kerosene	100-165°F	B, Combustible
Auto lubricating oil	300-450"F	C, Not a fire hazard
Toluene	40°F	A, Flammable
Methyl cellosolve	115°F	B, Combustible
Ethylene glycol	232°F	C, Not a fire hazard

The *FLASH POINT is* the temperature at which a liquid gives off enough vapor to burst into flame when exposed to an ignition source.

FLAMMABLE LIQUIDS have a flash point below 100°F. Turpentine and toluene are examples.

COMBUSTIBLE LIQUIDS have a flash point of 100°F or greater, but below 200°F. Kerosene and methyl cellosolve are examples.

Liquids that don't ignite easily at temperatures below 200"F are neither flammable nor combustible. Auto lubricating oil and ethylene glycol are examples,

5) **Note:** **You** *may wish to use the master at the back of this book (Appendix E, page E-8) to make an overhead of the label, or write the warning on the chalkboard.*

D Chemicals that must be kept away from other chemicals are reactive. The warning does not identify any specific type of fire hazard.

Note: *Direct trainees either to proceed to Application Exercise* 3A-2 *when finished or to wait for further instructions.*

4) Match each liquid with the type of fire hazard it presents.

_ Turpentine ignites at 95°F.

___ Kerosene ignites at 1OO-165"F.

___ Auto lubricating oil ignites at 300-450°F.

___ Toluene ignites at 400F.

___ Methyl cellosolve ignites at 115°F.

___ Ethylene glycol ignites at 232°F.

A) Flammable liquid

B) Combustible liquid

C) Neither flammable nor combustible

5) A label on a can of drain opener reads

NEVER USE OR MIX WITH OTHER CHEMICALS. KEEP AWAY FROM ALUMINUM UTENSILS AND ALUMINUM-CONTAINING MATERIALS.

Which type(s) of physical hazard does this product present?

A) Flammable B) Oxidizer C) Pyrophoric D) Reactive

Now go back to page 3-5, fold over the right side of the page, and&e&your answers. Look on the back of the question page for more information on each question. If you are taking this course as a self-study, continue to Application Exercise 3A-2, "DOS and DON'Ts" when you have finished. If you are taking this course in a classroom situation, wait for further instructions from your trainer when finished.

TRAINER'S NOTES APPLICATION EXERCISE 3A-2

Ask trainees to turn to page 3-9 of their Student Workbook. Either lead the class through Application Exercise 3A-2 as a group activity, or provide time for students to complete the exercise individually or in small groups. The answers and additional information given below appear on pages 3-10 and 3-12 of the Student Workbook.

Tailor these questions to your group by choosing questions related to operations or types of physical hazards present in your facility. For example, you may want to ask a trainee who sprays a solvent-based coating to describe the operation and identify the type(s) of physical hazard(s) present. You may also want to seek advice from a local specialist (health, safety, industrial hygienist) prior to the training session to help you customize these questions to your facility.

If time allows, ask the Optional Questions on page 3-16.

Answer	Additional Information
	Tell trainees: Larry works in the painting/coating operation of a manufacturing facility and does spray painting with a solvent-based paint.
	List choices and ask: What physical hazard is associated with Larry's job?
1) c	Like paints, many liquids used in solvent-based painting and coating operations are flammable. Ignition occurs easily at temperatures below 100°F.
	Read each DO or DON'T statement and poll trainees on whether or not they think Larry should follow the procedure/practice.
2) ABC	Proper disposal of waste containing flammable liquids is essential. Covered waste containers should be used to reduce the danger of exposure to an ignition source that could start a fire. Failure to properly dispose of paint-covered rags could also present a spontaneous combustion hazard. Fire extinguishers should be provided whenever a fire hazard exists, Smoking and electric heaters are potential ignition sources and are not allowed in areas where flammable liquids are present. No ash trays should be provided in the area because no one should smoke in there. Ash trays should be provided in the outer area so that cigarettes may be disposed of properly before entering the area.

APPLICATION EXERCISE 3A-2: DOS and DON'TS

Directions: Check or circle your answer(s) to each question, or write your answer in the blank provided. When you complete the exercise, fold over the right side of the page to check your answers. Then turn the page to get mom information about each question.

Larry works in the painting/coating operation of a manufacturing facility. He does spray painting with a solvent-based paint.

1) What physical hazard is associated with Larry's job?

A) Compressed gas
B) Pyrophoric
C) Flan-unable liquid
D) Explosive

2) Circle all the DOS and DON'TS associated with the physical hazard in Larry's job.

A) DON'T throw paint-covered rags into open trash containers.
B) DO have a portable fire extinguisher available at all times.
C) DON'T use an electric heater in the work area.
D) DO provide ash trays in the work area.

Answer **Additional Information**

Tell trainees: Marilyn works as a supervisor in a plant that uses ammonium nitrate to make gun powder and blasting agents.

List choices and ask: What physical hazards are associated with the ammonium nitrate in the plant where Marilyn works?

3) B, C Ammonium nitrate is explosive and is an oxidizer. Heat or reaction with certain other chemicals (but not water) can cause an explosion.

*Read each DO or **DON'T** statement andpoll trainees on whether or not **they** think Marilyn should **follow the procedure/practice.***

4) A B C D Special precautions and training are required to work safely with explosives. Extreme care must be taken to prevent contact with an ignition source. Handling explosives outdoors during a thunderstorm is hazardous because lightning could detonate the material.

Special regulations also apply to warehousing explosive materials. Wide, clear aisles are required to make sure **firefighting** equipment can be brought in without delay. Explosives must be stored away from materials that ignite easily — a fire could detonate the explosive, and an explosion could ignite the fire hazard.

Note: *Direct trainees either to **read** the introduction to Videotape Segment 3B when finished, or to wait for further instructions. If time allows, ask the Optional Questions that begin on page 3-16 of this guide.*

Marilyn works as a supervisor in a plant that uses ammonium nitrate to make gun powder and blasting agents.

3) What physical hazard is associated with the ammonium nitrate in the plant where Marilyn works?

A) Flammable liquid

B) Explosive

C) Oxidizer

D) Water-reactive chemical

4) What DOS and DON'Ts are associated with the physical hazard of ammonium nitrate in Marilyn's plant?

A) DONT carry matches or lighters into the work area.

B) DON'T store ammonium nitrate in the same warehouse where flammable or combustible chemicals are stored.

c) DO stop any surface operations during thunderstorms.

D) DO keep warehouse aisles wide and clear at all times.

Now go back to page 3-9, fold over the right side of the page, and check your answers. Look on the back of the question page for more information on each question. If you are taking this course as a self-study, proceed to Videotape Segment 3B when you have finished. If you are taking this course in a classroom situation, wait for further instructions from your trainer when finished.

TRAINER'S OPTIONAL QUESTIONS: Application Exercise 3A-2

Tailor these questions to your group by choosing questions related to operations or types of physical hazards present in your facility. For example, you may want to ask a trainee who sprays a solvent-based coating to describe the operation and identify the type(s) of physical hazard(s) present. .

You may also want to seek advice from a local specialist (health, safety, industrial hygienist) prior to the training session to help you customize these questions to your facility.

O1) *Tell trainees: Karen works as a fire safety inspector and checks carbon dioxide cylinders connected to extinguisher systems.*

List choices and ask: What physical hazard is associated with the cylinders Karen inspects?

A) Compressed gas

B) Water-reactive chemical

C) Flammable liquid

D) Pyrophoric

Answer: A; Compressed Gas

Carbon dioxide is a gas. It is compressed into cylinders and used to put out fires involving flammable or combustible liquids.

Water-reactive chemicals and fire hazards are not used as extinguishing agents.

STUDENT WORKBOOK: No Reference

TRAINER'S OPTIONAL QUESTIONS: Application Exercise 3A-2 Continued

02) *Read each DO or **DON'T** statement **below and poll** trainees on whether or not **they** think Karen should follow the **procedure/practice.***

A) DON'T use sparking tools in the area where the carbon dioxide cylinders are stored.

B) DO use a power wrench to tighten the gas cylinder valves.

c) DO make sure the cylinders are properly secured.

D) DON'T drop, bang, or shock the cylinders.

Answer: Answer: C, D

Sparking tools (electric saws, drills, etc.) should not be used nesr fire hazards. Carbon dioxide is not a fire hazard — it's used to put out frees.

Compressed gases contain a lot of stored energy. A power wrench could easily break the valve stem and turn the cylinder into a powerful rocket.

Securing compressed gas cylinders and handling them properly helps avoid physical damage that could result in a rocket-type disaster,

03) *Tell trainees:* Sara works at a hospital where oxygen is used to treat patients with respiratory diseases.

*List choices and **ask**:* What physical hazard is associated with the oxygen in Sara's workplace?

A) Oxidizer

B) Flammable liquid

c) Water-reactive chemical

D) Unstable chemical

Answer: A; Oxidizer

Oxygen is an oxidizer. It can start fires in other materials, and it is one of three essential ingredients of fire itself. (The other two are fuel and heat.)

STUDENT WORKBOOK: No Reference

TRAINER'S OPTIONAL QUESTIONS: Application Exercise 3A-2 Continued

O4) *Read each DO or DONT statement below* ***and poll*** *trainees on whether or not* ***they*** *think* ***Sara*** *should follow* ***the procedure/practice.***

A) DON'T smoke in areas where oxygen is used or stored.

B) DON'T store **oxygen cylinders** near flammable gases.

C) DON'T eat or drink in areas where **oxygen** is being used.

D) DO use hand trucks to transport oxygen cylinders.

Answer; **A, B, D**

Although not flammable itself, **oxygen** gas must be kept away from ignition sources and **flammable** materials because it makes **fires** start easily and burn with great intensity.

Hand trucks should be used to transport all compressed gas cylinders. This helps prevent cylinder damage or shock that could release the energy stored in the compressed gas.

Oxygen gas is present in the air and essential for human life. If swallowed, it is not a health hazard. We swallow dissolved oxygen every time we drink a glass of water.

STUDENT WORKBOOK: No Reference

TRAINER'S NOTES: Introduction to Videotape Segment 3B

Note: *Ask trainees to look at the videotape introduction on page 3-13 of the Student Workbook.*

Ask trainees to ***recall*** *the definition of a health hazard — chemicals that can cause injury or illness when you are exposed by skin or* ***eye*** *contact, skin absorption, inhalation, or ingestion.*

Remind trainees that the health effects depend on the ***type*** *of health hazard.*

■ As we watch this videotape, you should learn to recognize —

" the different types of health hazards; and

. the health effects each type can produce.

INTRODUCTION TO VIDEOTAPE SEGMENT 3B: Types of Health Hazards

Health hazards are chemicals that can cause injury or illness when you are exposed by skin or eye contact, skin absorption, inhalation, or ingestion. The type of injury or illness —

- ranges from short-term irritation to permanent darnage or death; and

. depends on the type of health hazard.

As you watch this videotape segment, look for the different types of health hazards and the health effects each type can produce.

Now, watch Videotape Segment 3B.

STUDENT WORKBOOK PAGE: 3-13

TRAINERS NOTES: Application Exercise 3B-I

Ask trainees to turn to page 3-15 of their Student Workbook. Either lead the ***class*** *through Application* ***Exercise 3B-1*** *as a group* ***activity, or provide*** *time for students to complete the* ***exercise*** *individually or in small groups. The answers and additional information* ***given*** *below appear on pages 3-16 and 3-18 of the Student Workbook.*

Answer	Additional Information
1)	*You may wish to list the eight types of health hazards (choices A-H) on the chalkboard and ask,* 'Which type **of hazard** _____**?** " *for each* ***description.***
B	Burns skin on contact
E	Causes cancer
A	Causes the skin to itch upon contact
G	Damages genes in sperm and egg cells
D	Can cause an allergic-like response
c	Causes liver damage
F	Damages the fetus during its development
H	Freezes the skin on contact

CORROSIVES burn on contact, causing visible damage or irreversible changes to body tissues.

CARCINOGENS are chemicals that can cause cancer.

IRRITANTS react with the body at the site of contact, causing the skin to redden or itch. Repeated contact **can** crack or break the skin, but the damage is reversible.

MUTAGENS cause genetic changes in sperm and egg cells. This can cause sterility, birth defects, and miscarriages.

SENSITIZERS cause an allergic-like response in many people who are repeatedly exposed to the chemical. The response can happen on the second exposure, or any exposure thereafter.

TARGET ORGAN *CHEMICALS* damage a specific organ or body system, such as the liver.

TERATOGENS *are* reproductive hazards that damage the fetus during its development.

CRYOGENICS are very cold materials that cause frostbite by freezing body tissues on contact.

APPLICATION EXERCISE 3B-1: Defining Health Hazards

*Directions: Check or **circle** your answer(s) **to each** question, or write your answer in the blank **provided.** When you complete the **exercise,** fold over the **right** side of the page to check your answers. Then turn the page to get **more** information about each question.*

1) Match the description with the type of health hazard.

___ Burns skin on contact	A) Irritant
___ Causes cancer	**B) Corrosive**
___ Causes the skin to itch on contact	C) Target organ chemical
___ Damages genes in sperm and egg ceils	D) Sensitizer
_ Can cause an allergic-like response	E) Carcinogen
___ Causes liver damage	F) Teratogen
_ Damages the fetus during its development	G) Mutagen
_ Freezes the skin on contact	H) Cryogenic

Answer	Additional Information
2) B	There is no way to tell who will become sensitized to a chemical nor how long it may take. The allergic-like response can appear on any exposure after your first exposure. Some workers become sensitized over time. Suddenly they develop symptoms that they never had before — usually itching, a skin rash, or difficulty breathing. Others who are repeatedly exposed to the same sensitizer never develop the allergic-like response.
3) B	Corrosives burn on contact. They can damage your skin, eyes, digestive tract, or respiratory system. The tissue damaged depends on the exposure route.

Note: *Direct trainees either to proceed with Application Exercise 3B-2 when finished, or to wait for further instructions.*

2) Will you know if you have been sensitized to a chemical at the time of your first exposure?

A) Yes

B) No

3) Do corrosives damage only skin?

A) Yes

B) No

Now go back to page 3-15, fold over the right side of the page, and check your answers. Look on the back of the question page for more information on each question. If you are taking this course as a self-study, continue to Application Exercise 3B-2, "Recognizing Workplace Health Hazards," when you have finished. If you are taking this course in a classroom situation, wait for further instructions from your trainer when finished.

STUDENT WORKBOOK PAGE: 3-17

Ask trainees to turn to page 3-19 of their Student Workbook. Either lead the class through Application Exercise 3B-2 as a group activity, or provide time for students to complete the exercise individually or in small groups. The answers and additional information given below appear on page 3-20 of the Student Workbook.

Note: *The purpose of this exercise is to help trainees understand the general relationship between certain symptoms and certain types of chemicals. It is less critical that they know the particular symptoms and chemicals included in this segment.*

Answer	Additional Information
1) D	Like many maintenance cleaning products, dilute ammonia water is an irritant. The vapors cause reddening and irritation on contact. Proper ventilation is a must when working with irritants that become airborne easily. When the ventilation system is working properly, the vapors are diluted with fresh air. This lowers the exposure hazard by reducing Fran's dosage, and she experiences no irritating symptoms. Cryogenics are very cold chemicals that can freeze body tissue on contact, causing frostbite. Corrosives burn on contact. The damage is more severe than that produced by an irritant and maybe irreversible. Teratogens damage the fetus during its development,
2) A	Corrosives eat away or burn body tissue on contact. Caustic cleaners are corrosives. So are other strong acids and bases. Skin contact causes burns, like Jack's. Eye contact can permanently damage your eyesight. Breathing corrosive gases, vapors, or mists can severely damage the respiratory tract, When swallowed, corrosives burn the mouth and esophagus.

Note: *Direct trainees either to proceed to the Lesson Summary when finished, or to wait for further instructions. If time allows, ask the Optional Questions that begin on page 3-30 of this guide.*

APPLICATION EXERCISE 3B-2: Recognizing Workplace Health Hazards

*Directions: Check or **circle your** answer(s) to each question, or write your answer in the blank provided. When you complete the exercise, fold over the right side of the page to check your answers. Then turn the page to get more information about each question.*

1) Fran uses ammonia water to clean floors and tiled walls. One day, the air conditioning system stopped working in the room where Fran was cleaning. Her eyes got red and irritated, and her nose and throat hurt. What kind of health hazard is the ammonia cleaner?

   A) Corrosive

   B) Teratogen

   C) Cryogenic

   D) Irritant

2) Jack works in a metal cleaning operation. He was burned when the caustic cleaner splashed on his arm. What kind of health hazard is the cleaner?

   A) Corrosive

   B) Sensitizer

   C) Irritant

   D) Mutagen

*Now fold over the right side of the page, and check your answers. Look on the back of the question page for more information on each question. If you **are** taking this course as a **self-study,** proceed to the Lesson Summary when you have finished. If you are taking this course in a classroom situation, wait for further instructions **from** your trainer.*

STUDENT WORKBOOK PAGE: 3-19

TRAINER'S OPTIONAL QUESTIONS: Application Exercise 3B-2

Ask questions 01 and 02 as given, or locate MSDSS for a few familiar chemical materials in your facility (ones that all your trainees either use or can be expected to recognize, such as ammonia cleaner, a common gas, or a solvent) and ask the following:

- What is _____ used for?
- What do you think _____ can do to you?
- What type of health hazard is _____?

The health hazard data section of the MSDS should give you the answers to the last two questions. If it does not do so clearly, choose another material or consult a local expert about the correct answers.

_____

01) *Tell trainees:* Liz and her friend worked twenty years ago for 6 months in a plant where benzidine was used to make dyes. This year, both have developed the same type of bladder cancer.

List choices and ask: What type of health hazard is benzidine?

A) Carcinogen
B) Reproductive hazard
C) Teratogen
D) Corrosive

Answer: A; Carcinogen

Benzidine is one of the chemicals included in the special OSHA standard for thirteen carcinogens. It causes bladder cancer, which takes many years to develop.

No one knows the minimum dosage of benzidine required to cause cancer. This is true of all carcinogens. Thus, no exposure to a carcinogen is considered safe or free of cancer risk.

STUDENT WORKBOOK PAGE: No Reference

O2) *Tell trainees:* Jim uses urethane foam containing TDI (toluene diisocyanate) to make packaging materials. One day he suffers a severe asthmatic attack and can hardly breathe.

List choices and ask: What kind of health hazard is TDI?

A) Irritant
B) Sensitizer
C) Reproductive
D) Corrosive

Answer: B; Sensitizer

Like many isocyanates, TDI is a sensitizer. When Jim became sensitized, he experienced the allergic-like reaction associated with TDI — a severe asthmatic attack that makes breathing extremely difficult.

Jim worked with the foam many times before experiencing the allergic-like reaction. Other workers become sensitized on their first exposure, and suffer an asthmatic attack on their second exposure.

STUDENT WORKBOOK: No Reference

TRAINER'S NOTES: Review of Videotape Segment 3A

*If **time permits,** review and reinforce learning objectives by asking the following open-ended questions answered in the **Summary. After** each question **ask** for specific examples **from** the trainees' work environment. Draw attention to the Summary for **future** reference.*

Q1) What are the four basic types of physical hazards? (List and define.)

Answer:

- *COMPRESSED GASES* — contain a lot of stored energy. Sudden release produces rocket effect.
- *EXPLOSIVES* — cause a sudden release of pressure and heat.
- *FIRE HAZARDS* — ignite and burn easily or cause/support **fire** in other materials.
- *UNSTABLE/REACTIVE CHEMICALS* — produce or release hazards under commonly **occurring** temperatures, pressures, or light conditions.

Q2) What are the four types of **fire** hazards? (List and define.)

Answer:

- *PYROPHORICS* — ignite spontaneously in air below 130°F.
- *FLAMMABLE LIQUIDS* — ignite easily at temperatures below 100°F.
- *COMBUSTIBLE LIQUIDS* — ignite easily at or above 100°F, but below 200°F.
- *OXIDIZERS* — supply the oxygen required to start or support **fire.**

Q3) What three types of hazards are classified as unstable or reactive? (List and define.)

Answer:

Unstable and reactive **chemicals** produce or release hazards under commonly occurring temperatures, pressures, or light conditions.

- *DECOMPOSITION HAZARDS* — easily break up into simpler substances,
- *POLYMERIZATION HAZARDS* — self-react to form long molecular chains, releasing heat and/or a hazardous chemical in the process.
- *WATER-REACTIVE **CHEMICALS*** — react violently with water resulting in physical and/or health hazards.

LESSON 3 SUMMARY

The Hazard Communication Standard helps protect you from both physical hazards and health hazards in the workplace.

PHYSICAL HAZARDS include:

- *COMPRESSED GASES* — contain a lot of stored energy, sudden release produces rocket effect.
- *EXPLOSIVES* — cause a sudden release of pressure and heat.
- *FIRE HAZARDS* — ignite and burn easily or cause/support fire in other materials.
- *UNSTABLE/REACTIVE CHEMICALS* — *Produce or* release hazards under commonly occurring temperatures, pressures, or light conditions.

FIRE HAZARDS include:

- *PYROPHORICS* — ignite spontaneously in air below 130°F.
- *FLAMMABLE LIQUIDS* — ignite easily at temperatures below 100°F.
- *COMBUSTIBLE LIQUIDS* — *ignite* easily *at or* above 100°F, *but* below 200°F.
- *OXIDIZERS* — supply the oxygen required to start or support free.

UNSTABLE/REACTIVE CHEMICALS include:

- *DECOMPOSITION HAZARDS* — *easily* break up into simpler substances.
- *POLYMERIZATION HAZARDS* — self-react to form long molecular chains, releasing heat and/or a hazardous chemical in the process.
- *WATER-REACTIVE CHEMICALS* — react violently with water resulting in physical and/or health hazards.

STUDENT WORKBOOK PAGE: 3-21

Q1) **What are** the seven basic types of health hazards? (List and define.)

Answer:

- *IRRITANTS* — cause reddening, itching, or other irritation on contact.
- corrosives — burn *or* eat away body tissues *on* contact.
- *CRYOGENICS* — freeze body tissue on contact.
- Chemicals that damage *a SPECIFIC' ORGAN OR SYSTEM.*
- *REPRODUCTIVE HAZARDS* — target the reproductive system, causing sterility, miscarriages, fetal injury, or birth defects.
- *SENSITIZERS* — cause an allergic-like response in many people who are repeatedly exposed.
- *CARCINOGENS* — cause cancer.

Q2) **What are** the two types of reproductive hazards? (List and define.)

Answer:

- *MUTAGENS* — *damage* genes in egg or sperm cells.
- *TERATOGENS* — damage the fetus during its development.

***HEALTH** HAZARDS* include:

- ***IRRITANTS*** — cause reddening, itching, or other irritation on contact.
- *CORROSIVES* — burn or eat away body tissues on contact.
- *CRYOGENICS* — freeze body tissue on contact.
- Chemicals that damage a *SPECIFIC ORGAN OR SYSTEM.*
- *REPRODUCTIVE HAZARDS* — **target** the reproductive **system,** causing sterility, miscarriages, fetal injury, or birth defects.
- *SENSITIZERS* — cause an allergic-like response in many people who are repeatedly exposed.
- *CARCINOGENS* — cause cancer.

REPRODUCTIVE HAZARDS include

- *MUTAGENS* — damage genes in egg or sperm cells.
- ***TERATOGENS*** — *damage* the fetus during its development.

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